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KLA KIM LUNDGREN ASSOCIATES, INC.

Final Report

Town of Acton GHG Inventory

January 14, 2019

Overview

- Background
- Results Summary
- Municipal Inventory
- Community Inventory
  - Gas Leak Study
  - Carbon Sequestration
- Recommendations
- Model Review

Background

GHG Inventories

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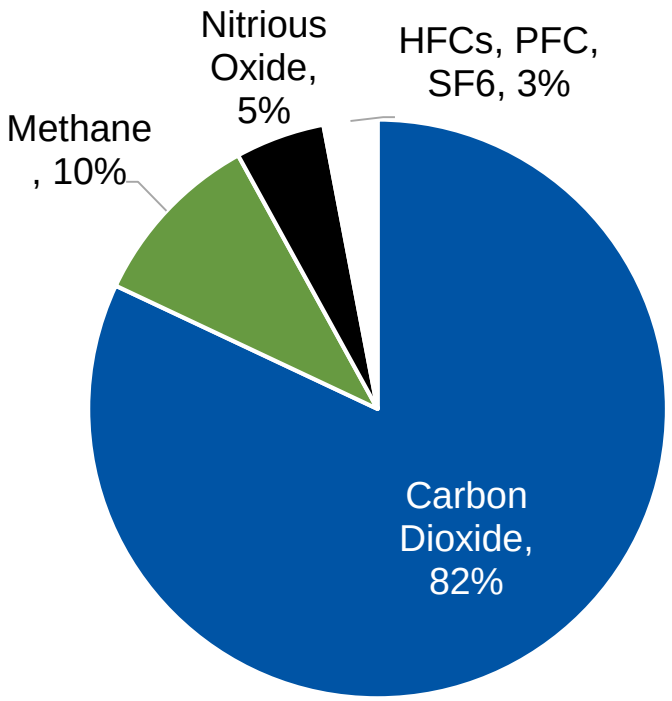
Greenhouse Gases and Sources

Greenhouse Gas	Activities	GWP
Carbon dioxide (CO_2)	Burning fossil fuels	1
Methane (CH_4)	Burning fossil fuels, agricultural activities, landfill, wastewater treatment practices	28
Nitrous oxide (N_2O)	Burning fossil fuels, agricultural activities, industrial activities, landfill decomposition, wastewater treatment practices	265
Perfluorocarbons	Electronics industry	6,630 – 23,500
Hydrofluorocarbons	Air conditioning and refrigeration	116 – 12,400
Sulphur hexafluoride	Switchgear at power installations	23,500



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Methodology

- Use existing greenhouse gas protocols including the:
  - Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (**GPC**)
  - U.S. Community Protocol for U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (**Community Protocol**)
  - Local Government Operations Protocol (**LGOP**)
- Designed to be:
  - **Relevant**
  - **Complete**
  - **Consistent**
  - **Transparent**
  - **Accurate**

Sources Considered

- **Stationary Energy**: Residential, commercial, and industrial buildings
  - Electricity
  - Natural Gas
  - Fuel Oil
- **Transportation**
  - Passenger & Commercial Vehicles
  - Railway
- **Waste**
  - MSW
  - Wastewater Treatment

Acton Attributes and Scope

- Occupies 20.3 square miles with a population of 23,777 in 2017
- The inventory includes:
  - Town of Acton Municipal Services
  - Acton Water District
  - Acton-Boxborough Regional School District
  - Commercial & Industrial Businesses
  - Residences

Results Summary

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Town of Acton Total Emissions

Baseline: 2017

Summary	Value (CO_2e)
Total Community Emissions	241,390 metric tons
Total Municipal Emissions	11,643 metric tons
Emissions Per Capita	10.2 metric tons/person

For Comparison

- **City of Cambridge** (2012)
  - 1.46 million metric tons CO2e
  - 13.8 metric tons person
  - *Lab and institutional spaces*
- **City of Somerville** (2014)
  - 651,426 metric tons CO2e
  - 8.25 metric tons/person
  - *Heavily residential, public transit*

Municipal GHG Inventory

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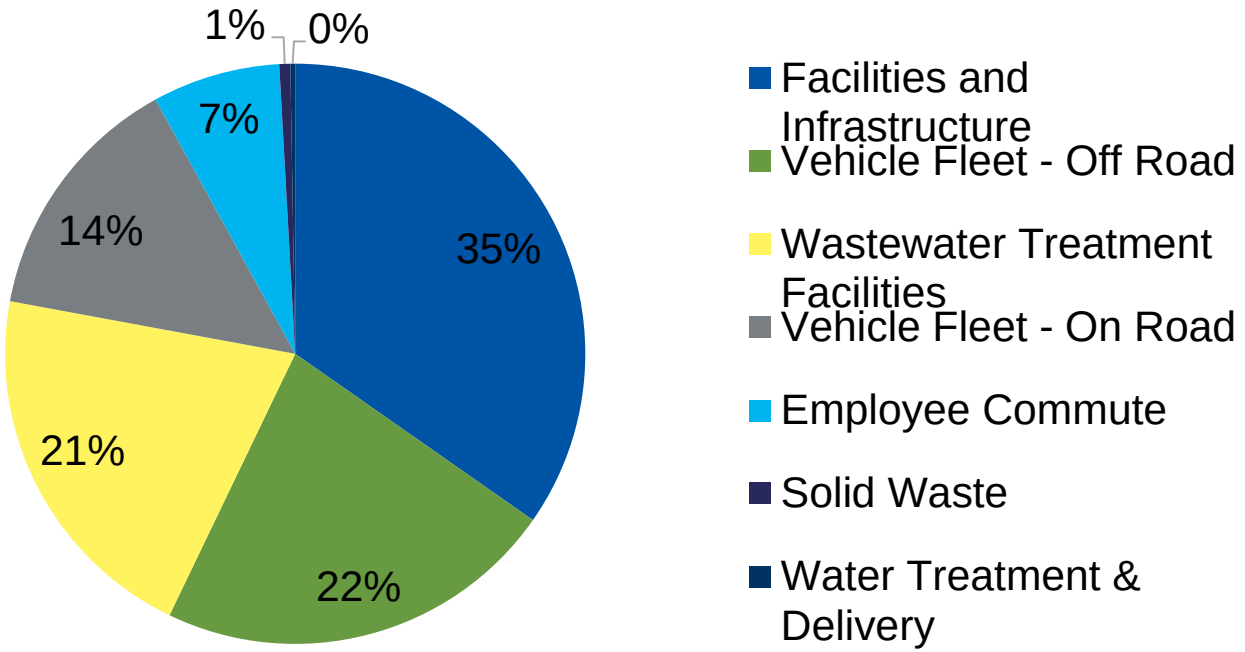
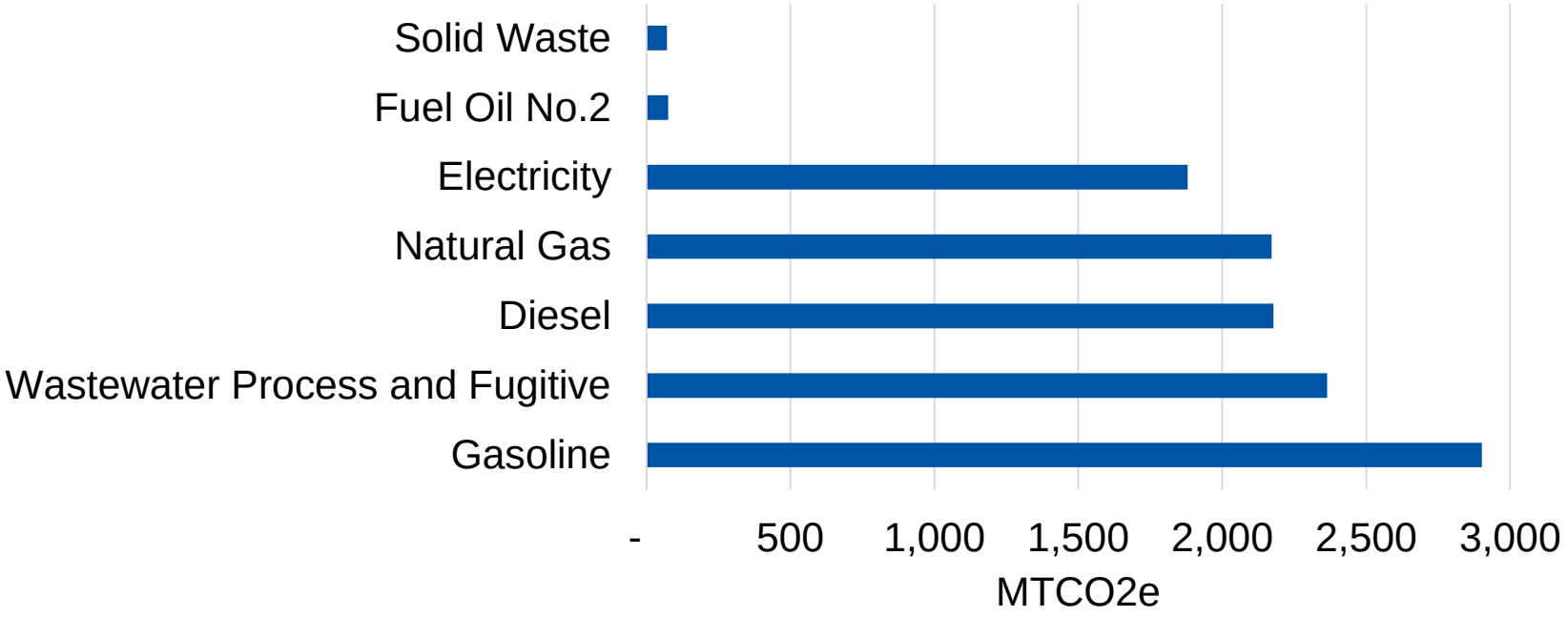
Local Government Operations Protocol (LGOP) Required Sources

- LGOP is a manual and tool developed to report GHGs for local government operations, developed in partnership with ICLEI and other climate organizations
- Inventory includes:
  - Buildings and other facilities
  - Streetlights and traffic signals
  - Water delivery facilities
  - Vehicle fleet
  - Transit fleet
  - Solid waste facilities

Municipal Emissions by Sector



Municipal Emissions by Source



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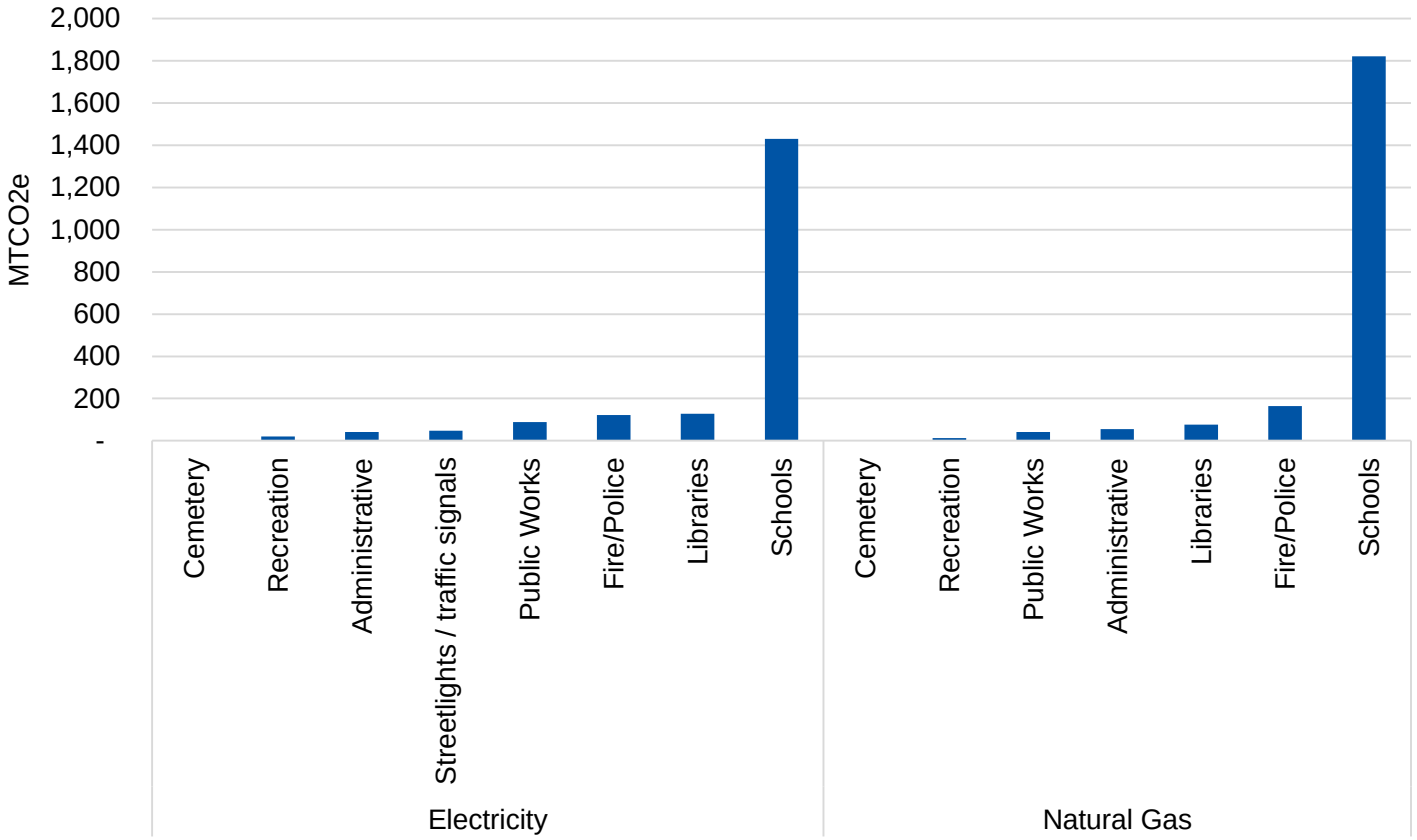
Municipal Emissions by Department

Electricity and Natural Gas



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Conclusions

- 35% of municipal emissions came from operating the Town's municipal buildings and schools
- School buildings were responsible for 28% of the total municipal inventory
  - Natural gas use for heating and hot water released more emissions than electricity consumption.
- 37% percent of the emissions came from the Town's vehicle fleet (both on-road and off-road).
  - Off-road vehicles were responsible for 22% and on-road were responsible for 14%.

Community Inventory

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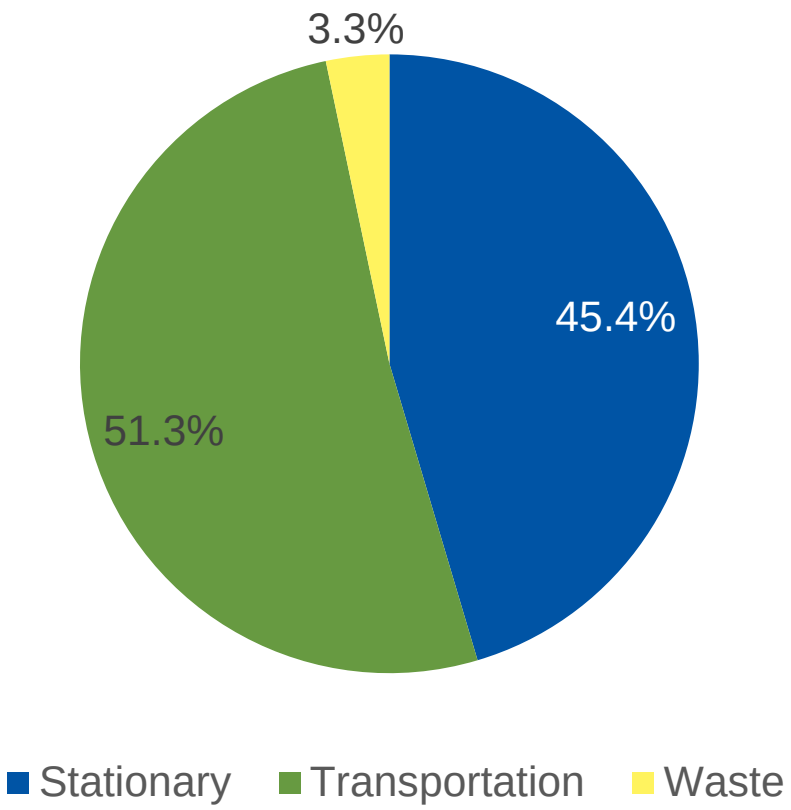
Results Summary

Community Inventory



Total Emissions (CO2e)

241,390 metric tons

Emissions Per Capita:

10.2 metric tons/person

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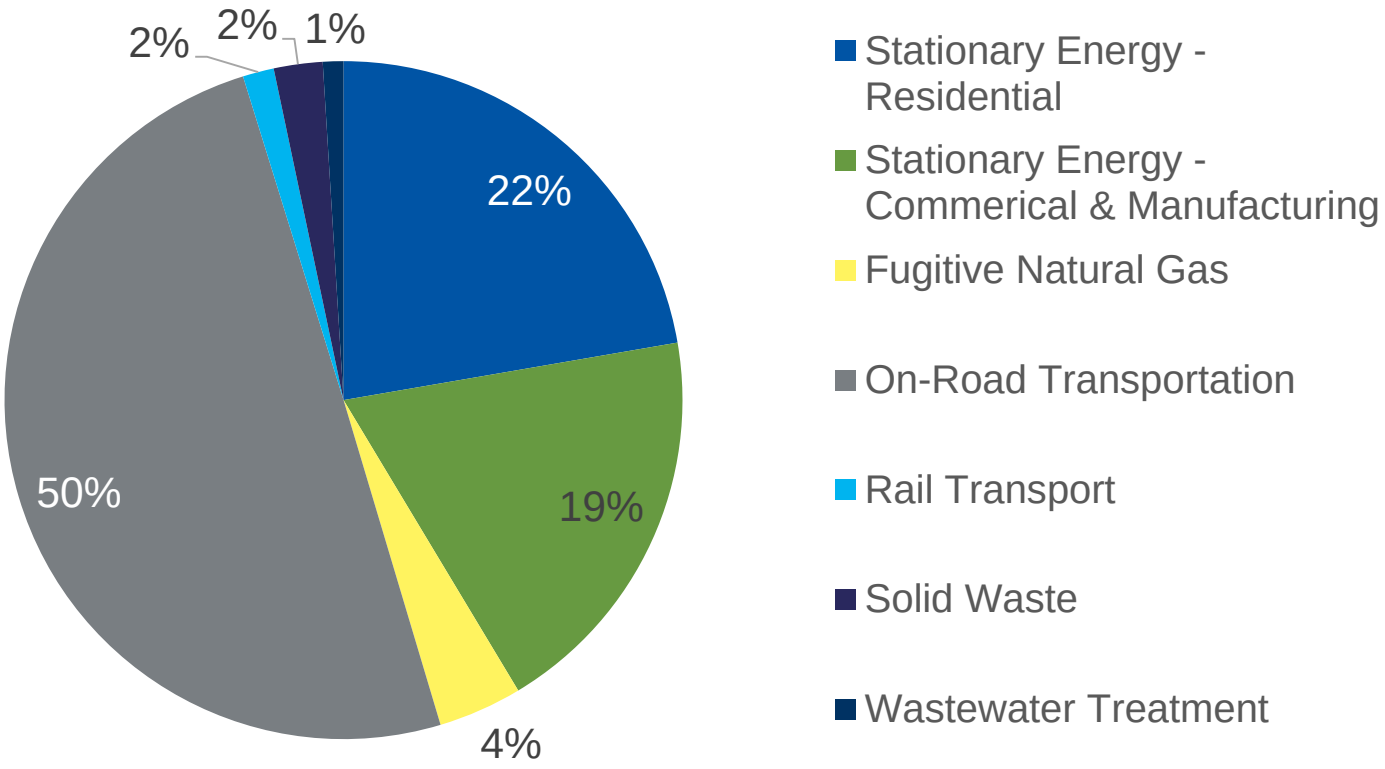
Total Emissions by Source Sector

Community Inventory



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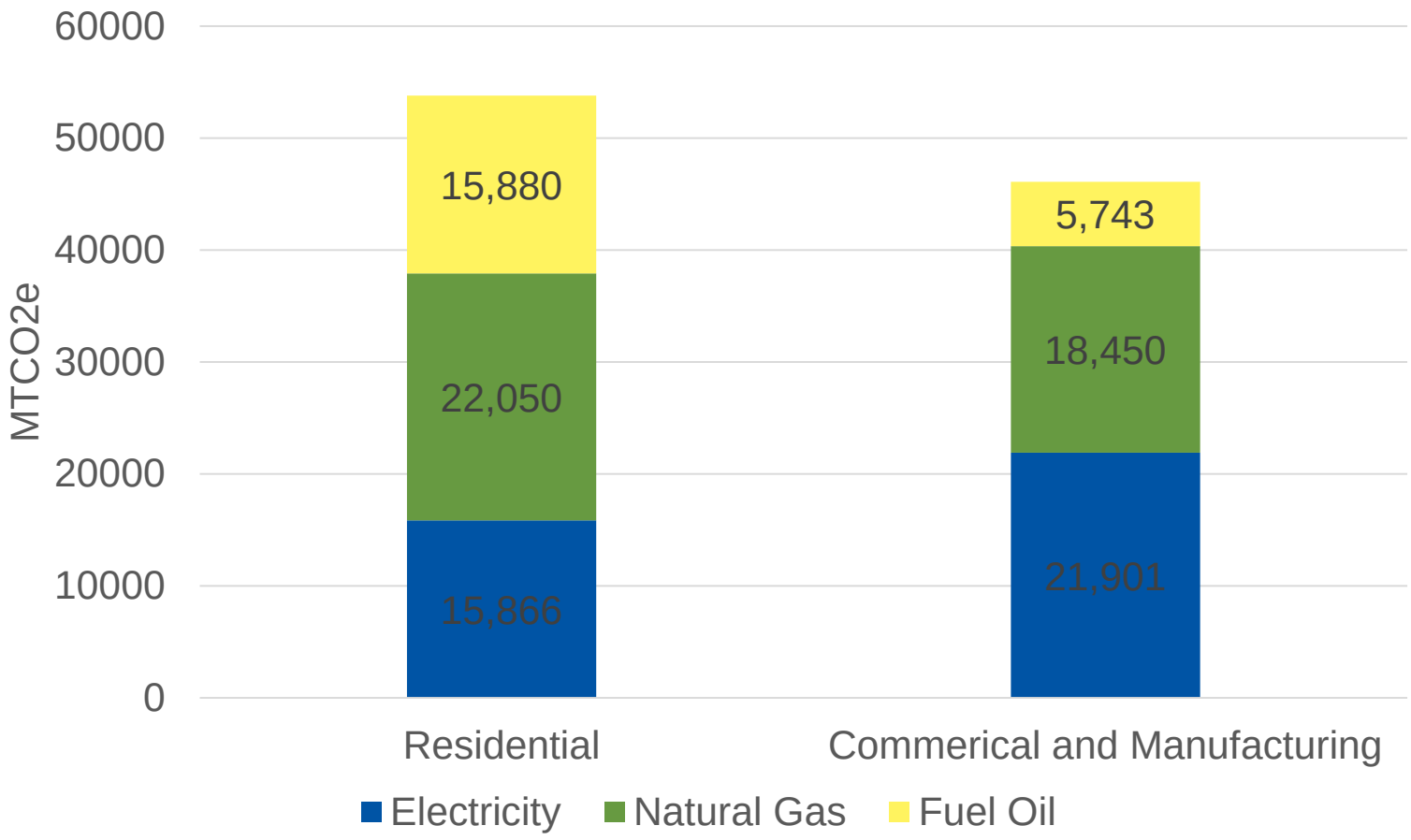
Stationary Emissions

By Building Sector



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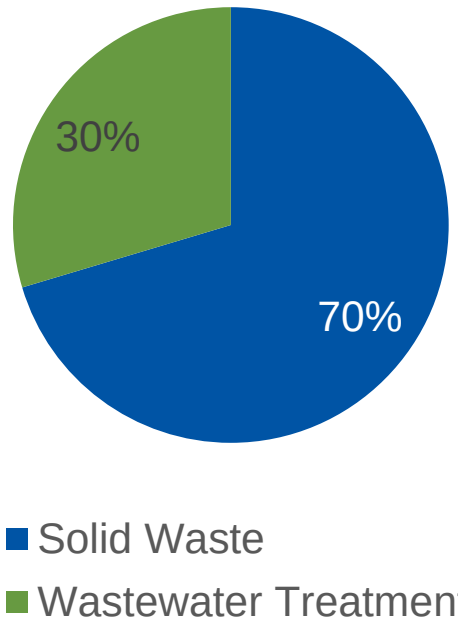
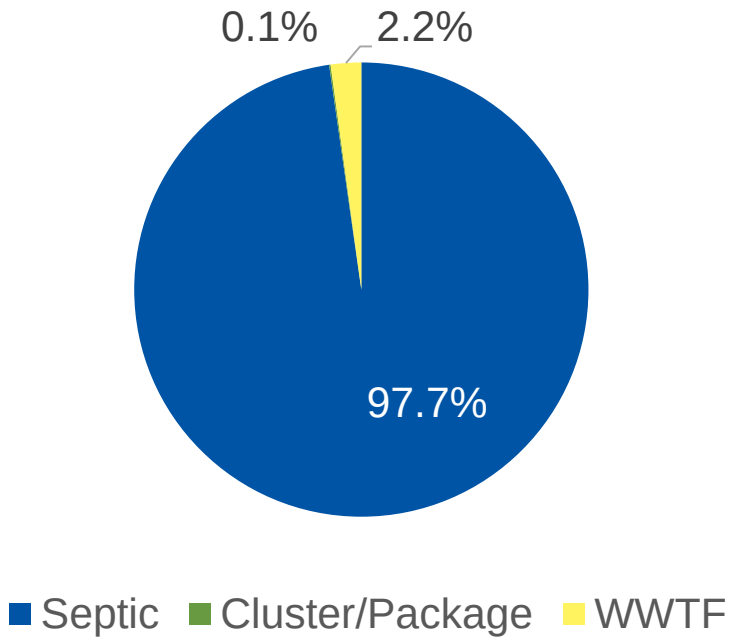
Waste Emissions

Wastewater and Solid Waste Management



Total Waste Sector Emissions Composition



Wastewater Treatment Emissions Composition

Notable Emissions Contributors

Community Inventory

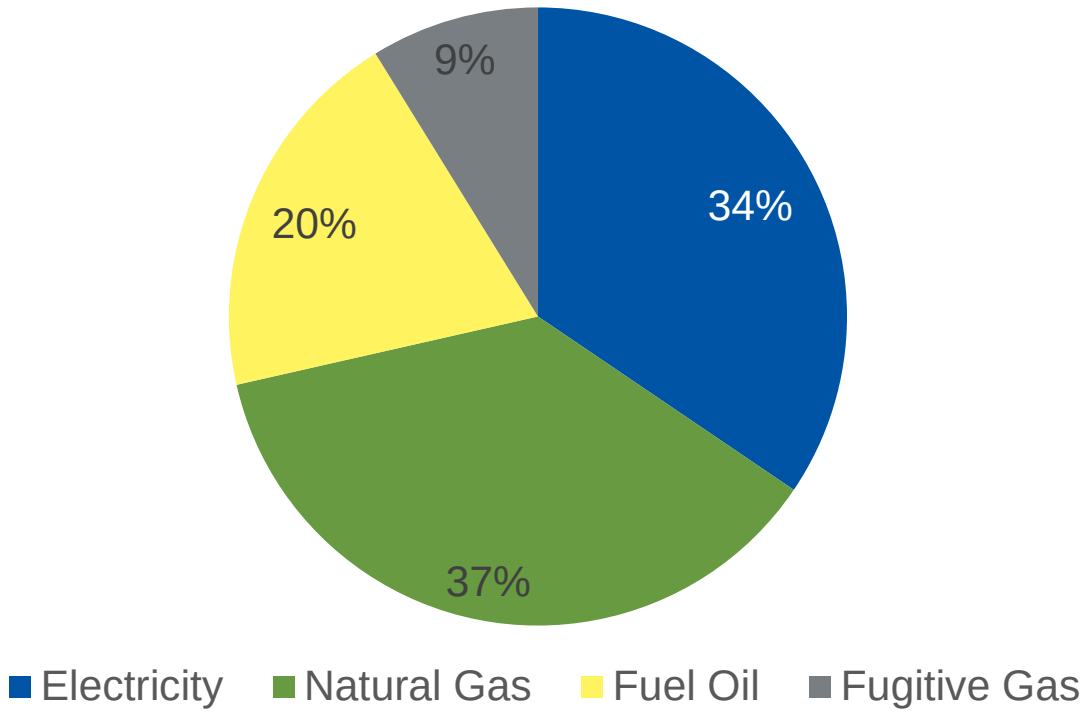
- **Residential Stationary Energy**
  - More emissions produced than commerical
  - Commercial has more electricity emissions
- **Transportation**: On-road vehicles
- **Wastewater Treatment**: Septic system methane release

Gas Leak Study

- 2015 Harvard Study: 2.7% of gas is leaked
  - Could not determine Acton-specific value based on available data
- Estimated **211,750 Therms of natural gas leaked** in 2017
- Depending on method, emissions range from **654 – 9,652 MTCO2e**
  - 0.27- 4.0% of total 2017 emissions

Stationary Emissions by Fuel

Including Fugitive Gas



Carbon Sequestration Study

Assessment of Conservation Land

- Utilize carbon storage factors for tree type and age
  - Tree data provided by Natural Resources Division
- **Total Estimated Storage**
  - Above Ground: **554,844 MTCO$_2$e**
  - Below Ground: **439,430 MTCO$_2$e.**
- 4.1x the Town's annual emissions

Recommendations

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Key Takeaways

- **Schools** are the largest municipal electricity and natural gas consumer
- **Municipal emissions** make up **less than 5%** of total community emissions
  - There are areas for reduction within municipal operations, but larger savings will come from community measures
- **Passenger vehicle travel** and **residential stationary energy use** represent key target areas for emissions reduction

Recommendations

- **Pursuit of energy efficiency program**s available via MassSave to reduce energy consumption in both the residential and C&I sector
- **Strategic electrification** via the conversion of fuel oil heating systems to electric, in conjunction with further integration of renewable energy
  - Increase in Acton Power Choice Standard renewable energy percentage
- Further **assessment and repair of natural gas leaks**
- Expansion of **public transit or ride-sharing/carpooling opportunities** to address transportations sector emissions

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Thank You